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5

GANG-TYPE ROTARY LAWN MOWER

BACKGROUND OF THE INVENTION

The invention relates to rotary lawn mowers and to gang-type lawn mowers.

Historically, reel mowers have been used to cut golf course roughs. It is generally recognized that rotary mowers are better suited for cutting tall grass, where scalping is not a problem, while reel mowers are better for shorter cutting. A gang of reels can be either attached directly to the frame on which the operator rides, or pulled behind a tractor. Pull-behind or tow-behind rotary gangs are also known. These can be driven either by a power takeoff or by a separate engine. Tow-behind gangs, whether reel or rotary, are generally undesirable for cutting a golf course rough because close trimming is difficult. Thus, rotary mowers have not been used to cut golf course roughs, which require close trimming and the ability to cut undulating terrain at a relatively short length.

SUMMARY OF THE INVENTION

The invention provides a gang-type rotary lawn mower suitable for cutting a golf course rough. This is a tremendous improvement over the known prior art, because a rotary mower typically requires substantially less maintenance than a reel mower. The lawn mower has single-spindle cutting decks attached directly to the frame on which the operator rides, with a front row of two or more cutting decks in front of the front wheels,

2

and with a rear row of one or more cutting decks between the front and rear wheels. The invention also provides an improved arrangement for mounting a rotary cutting deck on a lawn mower frame. Each deck is mounted on its own lifting arm so that the deck can move vertically relative to the frame and can pivot relative to the frame about three mutually perpendicular axes.

More particularly, the invention provides a gang-type rotary lawn mower comprising a frame supported by front and rear wheels, an operator's seat mounted on the frame, at least two side-by-side front cutting deck assemblies mounted on the frame in front of the front wheels, and at least one rear cutting deck assembly mounted on the frame behind the front wheels and in front of the rear wheels. Each of the front and rear deck assemblies includes a pair of laterally-spaced, generally vertically-extending side plates, front wheels supporting the side plates for movement over the ground, and a rear roller extending between the side plates and supporting the side plates for movement over the ground. Each deck assembly also includes a single-spindle cutting deck located between the side plates and in front of the roller, the deck being mounted on the side plates such that the height of the deck relative to the ground is adjustable. The roller extends across substantially the entire width of the deck. The roller resists scalping and stripes the grass, both of which are aesthetically desirable.

Each deck assembly is connected to the frame by a generally L-shaped, horizontally-extending lifting arm operable to lift the

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deck assembly relative to the frame. Each deck assembly is connected to the frame by its own lifting arm. Each lifting arm has an inner end pivotally connected to the frame. A cross member is mounted on the outer end of the lifting arm for pivotal movement about a generally vertical axis and about a generally horizontal axis extending in the forward-rearward direction. One end of the cross member is connected to one of the deck assembly side plates for pivotal movement about a generally horizontal, laterally-extending axis adjacent the forward ends of the side plates, and the other end of the cross member is connected to the other side plate for pivotal movement about the same axis.

This construction enables the lawn mower to cut the undulating terrain of a golf course rough and to be controlled for close trimming. Also, as mentioned above, the lawn mower requires much less maintenance than the reel mowers historically used to cut a golf course rough.

Other features and advantages of the invention will become apparent to those skilled in the art upon review of the following detailed description, claims and drawings.

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a top plan view of a lawn mower embodying the invention.

Fig. 2 is a perspective view of a cutting deck assembly.

Fig. 3 is a top plan view of the cutting deck assembly.

Fig. 4 is a side elevational view of the cutting deck assembly.

Fig. 5 is a rear elevational view of the cutting deck assembly.

Fig. 6 is a view taken along line 6--6 in Fig. 3.

Before one embodiment of the invention is explained in detail, it is to be understood that the invention is not limited in its application to the details of the construction and the arrangements of components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A lawn mower 10 embodying the invention is illustrated in Fig. 1. Except as described below, the lawn mower 10 is identical to the lawn mower disclosed in U.S. Patent Application Serial No 08/787,384, filed January 22, 1997, titled "PARALLEL-SERIES FOUR-WHEEL-DRIVE HYDRAULIC CIRCUIT FOR A RIDING LAWN MOWER" and assigned to the assignee hereof. The lawn mower 10 comprises a frame 12 (partially shown in Figs. 2-5) supported by front wheels 14 and rear wheels 16 for movement over the ground. While the illustrated lawn mower 10 is rear-steering and has

four-wheel drive, it should be understood that the invention is applicable to front-steering or two-wheel-drive lawn mowers.

The lawn mower 10 further comprises a power source 18 supported by the frame 12. The power source may be any type known in the art, such as a gasoline-powered, internal-combustion engine. The engine drives a hydraulic pump (not shown) that supplies hydraulic fluid to hydraulic motors (not shown) drivingly connected to the wheels 14 and 16. The lawn mower 10 further comprises an operator's seat 20, and a conventional steering system, including a steering wheel 22, enabling the operator to steer the lawn mower 10. In the illustrated construction, the steering system is hydraulic and is connected to the rear wheels 16 to steer the lawn mower 10.

The lawn mower 10 further comprises front and rear rows 26 and 30, respectively, of cutting deck assemblies 34. More particularly, in the illustrated construction, the lawn mower 10 has three side-by-side front cutting deck assemblies 34 in front of the front wheels 14, and two rear cutting deck assemblies 34 behind the front wheels 14 and in front of the rear wheels 16. As is known in the art, each rear deck assembly 34 is aligned with the gap between two adjacent front deck assemblies 34.

Each of the cutting deck assemblies 34 includes (see Figs. 2-5) a single-spindle mulching deck 38 defining a downwardly opening space 42 (Fig. 4). The deck 38 is located between and supported by a pair of laterally-spaced, generally vertically-extending side plates 46 and 48. The term "lateral" is used

6

herein to mean the direction from one side of the lawn mower to the other, i.e., perpendicular to the forward-rearward direction. Two front wheels 50 rotate about an axle 54 (Figs. 2 and 3) extending between the side plates 46 and 48 in front of the deck 38, such that each front wheel 50 supports one of the side plates 46 and 48 and the deck 38 for movement over the ground. A rear roller 58 extends between the side plates 46 and 48 and also supports the side plates 46 and 48 and the deck 38 for movement over the ground. The roller 58 is behind the deck 38 and extends across substantially the entire width of the deck 38. The roller 58 resists scalping and stripes the grass.

The deck 38 is mounted on the side plates 46 and 48 such that the height of the deck 38 relative to the ground is adjustable. In the illustrated construction, the deck 38 includes spaced deck plates 66 and 68 (Figs. 3 and 5) extending upwardly adjacent the side plates 46 and 48, respectively. The upper end of each side plate 46 or 48 has thereon (see Fig. 2) generally horizontal, inwardly-extending ears 69 and 70, with the ear 69 adjacent the front of the side plate and the ear 70 adjacent the rear of the side plate. Fixed to the ears 69 and 70 of each side plate 46 or 48 is an elongated plate member 71 having outwardly-extending ears 72 and 73 respectively secured to the ears 69 and 70 by suitable means such as bolts or screws 74. Each side plate 46 or 48 and the corresponding plate member 71 has therein (see Figs. 4 and 6) a series of holes 76. Each of the deck plates 66 and 68 has therein several vertically-spaced

series of holes 78. Bolts 80 extending through holes 76 in the side plates 46 and 48 and in the plate members 71 and through holes 78 in the deck plates 66 and 68 secure the deck 38 to the side plates 46 and 48. The height of the deck 38 is adjusted by changing the holes 78 in the deck plates 66 and 68 and/or the holes in the side plates 46 and 48 and in the plate members 71 through which the bolts 80 extend.

A single spindle 84 (Fig. 4) is mounted for rotation about a generally vertical axis within the space 42 defined by the deck 38. The spindle 84 is driven by a hydraulic motor 88 on top of the deck 38. The above-mentioned pump supplies hydraulic fluid to the motor 88. It should be understood that other means could be used to drive the spindle 84.

A set of cutting blades is mounted on the spindle 84 for rotation therewith. In the illustrated construction, as shown in Figs. 3 and 4, each blade set includes a lower, leading blade 92 and an upper, trailing blade 96. The leading blade 92 has a leading cutting edge and an upwardly angled trailing edge or lift. Preferably, the lift of the leading blade 92 is angled upwardly at an angle of approximately forty-five degrees. The trailing blade 96 has a leading cutting edge for cutting clippings deflected upwardly by the lift of the leading blade 92. The blades are preferably identical to those disclosed in U.S. Patent Application Serial No. 08/787,382, filed January 22, 1997, titled "ROTARY LAWN MOWER MULCHING DECK" and assigned to the

assignee hereof. In alternative embodiments of the invention, different blade arrangements can be employed.

Each of the deck assemblies 34 is mounted on the frame 12 by a generally L-shaped, horizontally-extending lifting arm 112, such that each deck assembly is mounted on its own lifting arm 112. The lifting arm 112 has (see Figs. 2 and 3) a laterally-extending inner leg 116 with an inner end connected to the frame 12 for pivotal movement about a generally horizontal axis 120 extending in the forward-rearward direction. The arm 112 also has an outer leg 124 extending in the forward-rearward direction. A cross member 128 is mounted on the outer end of the outer leg 124 for pivotal movement about a generally vertical axis 132 and about a generally horizontal axis 136 extending in the forward-rearward direction. Each of the opposite, laterally-spaced ends of the cross member 128 has thereon (see Figs. 2, 3, 5 and 6) a downwardly and slightly rearwardly extending arm 140. The lower end of one arm 140 is connected to the side plate 46 for pivotal movement about a generally horizontal, laterally-extending axis 144 adjacent the forward ends of the side plates 46 and 48. The lower end of the other arm 140 is connected to the side plate 48 for pivotal movement about the axis 144.

A hydraulic assembly 148 (partially shown only in Fig. 5) connected between the arm 112 and the frame 12 pivots the arm about the axis 120 for lifting and lowering the deck 38. When the deck is lowered for cutting, the hydraulic assembly allows the lifting arm to "float," thereby allowing the deck 38 to move

vertically relative to the frame 12. The connection of the deck 38 to the arm 112 via the cross member 128 allows the deck 38 to pivot relative to the frame 12 about the three mutually perpendicular axes 132, 136 and 144. This mounting arrangement enables the deck 38 to adjust to undulating terrain, thereby substantially avoiding scalping.

It should be understood that the lawn mower 10 could have only two or more than three cutting decks in the front row, and only one or more than two cutting decks in the rear row. Also, other arrangements could be used to mount the decks on the frame 12.

Various features of the invention are set forth in the following claims.

CLAIMS

~~1. A gang-type rotary lawn mower comprising~~

a frame supported by wheels for movement over the ground,

a power source which is mounted on the frame and which drives at least two of the wheels,

an operator's seat mounted on the frame,

a steering system enabling the operator to steer the lawn mower,

at least two side-by-side front rotary cutting deck assemblies mounted on the frame, the front deck assemblies defining a gap between adjacent front deck assemblies, and

at least one rear rotary cutting deck assembly mounted on the frame behind the front deck assemblies, each rear deck assembly being aligned with a respective gap between adjacent front deck assemblies,

each of the front and rear deck assemblies including a single-spindle cutting deck defining a downwardly opening space, a single spindle mounted for rotation about a generally vertical axis within the space, and at least one cutting blade mounted on the spindle for rotation therewith.

2. A lawn mower as set forth in claim 1 wherein the front deck assemblies are mounted on the frame in front of the front wheels, and the rear deck assembly is mounted on the frame behind the front wheels and in front of the rear wheels.

3. A lawn mower as set forth in claim 1 wherein each deck assembly also includes a rear roller supporting the associated deck for movement over the ground, and wherein the deck has a width such that the roller extends across substantially the entire width of the deck.

~~4. A lawn mower as set forth in claim 3 wherein each of the front and rear deck assemblies includes a pair of laterally-spaced, generally vertically-extending side plates having forward ends, a first front wheel supporting one of the side plates for movement over the ground, and a second front wheel supporting the other of the side plates for movement over the ground, wherein the rear roller extends between the side plates and supports the side plates for movement over the ground, wherein the associated deck is located between the side plates and in front of the roller and is mounted on the side plates such that the height of the deck relative to the ground is adjustable.~~

5. A lawn mower as set forth in claim 1 wherein each deck assembly also includes a hydraulic motor which is mounted on the deck and which is drivingly connected to the spindle.

6. A lawn mower as set forth in claim 1 wherein each deck assembly includes a set of cutting blades mounted on the spindle for rotation therewith, the set of blades including a lower, leading blade having a leading cutting edge and an upwardly angled trailing edge, and an upper, trailing blade having a leading cutting edge for cutting clippings deflected upwardly by the upwardly angled trailing edge of the leading blade, the trailing blade extending at a non-perpendicular angle relative to the leading blade so that clippings coming off the trailing edge of the leading blade are cut immediately by the trailing blade before the clippings start swirling around within the space.

~~7. A lawn mower as set forth in claim 1 wherein each deck~~ assembly is connected to the frame by a cross member connected to the frame for pivotal movement about a generally vertical axis and about a generally horizontal axis extending in the forward-rearward direction, the cross member having opposite, laterally-spaced ends, one of the cross member ends being connected to one of the side plates of the associated deck assembly for pivotal movement about a generally horizontal, laterally-extending axis adjacent the forward ends of the side plates, and the other of the cross member ends being connected to the other of the side plates of the associated deck assembly for pivotal movement about the generally horizontal, laterally-extending axis.

8. A lawn mower as set forth in claim 7 wherein each of the deck assemblies is connected to the frame by a respective generally L-shaped, horizontally-extending arm having a laterally-extending inner leg with an inner end connected to the frame for pivotal movement about a generally horizontal axis extending in the forward-rearward direction, and the arm having an outer leg extending in the forward-rearward direction, the outer leg having an outer end, and wherein the cross member is mounted on the outer end of the outer leg.

9. A lawn mower as set forth in claim 8 wherein the arm is operable to lift the associated deck assembly relative to the frame.

10. A lawn mower as set forth in claim 1 wherein each deck assembly is connected to the frame by a respective lifting arm operable to lift the associated deck assembly relative to the frame, such that each of the deck assemblies is connected by its own lifting arm to the frame.

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11. A rotary lawn mower comprising

a frame supported by wheels for movement over the ground,

a power source which is mounted on the frame and which drives at least two of the wheels,

an operator's seat mounted on the frame,

a steering system enabling the operator to steer the lawn mower, and

a rotary cutting deck assembly including a pair of laterally-spaced, generally vertically-extending side plates which have forward ends and which are supported for movement over the ground, a single-spindle cutting deck defining a downwardly opening space, the deck being located between the side plates and being mounted on the side plates such that the height of the deck relative to the ground is adjustable, a single spindle mounted for rotation about a generally vertical axis within the space, and at least one cutting blade mounted on the spindle for rotation therewith, the deck assembly being connected to the frame by a cross member connected to the frame for pivotal movement about a generally vertical axis and about a generally horizontal axis extending in the forward-rearward direction, the cross member having opposite, laterally-spaced ends, one of the cross member ends being connected to one of the side plates for pivotal movement about a generally horizontal, laterally-extending axis adjacent the forward ends of the side plates, and the other of the cross member ends being connected to the other

~~the side plates for pivotal movement about the generally~~ horizontal, laterally-extending axis.

12. A lawn mower as set forth in claim 11 wherein the deck assembly is connected to the frame by a generally L-shaped, horizontally-extending arm having a laterally-extending inner leg with an inner end connected to the frame for pivotal movement about a generally horizontal axis extending in the forward-rearward direction, and the arm having an outer leg extending in the forward-rearward direction, the outer leg having an outer end, and wherein the cross member is mounted on the outer end of ~~the outer leg.~~

~~13.~~ 11 A lawn mower as set forth in claim ~~12~~ 10 wherein the arm is operable to lift the deck assembly relative to the frame.

~~14.~~ 13 A lawn mower as set forth in claim ~~14~~ 12 wherein the deck assembly also includes a hydraulic motor which is mounted on the deck and which is drivingly connected to the spindle.

~~15.~~ 14 A lawn mower as set forth in claim ~~14~~ 13 wherein the deck assembly includes a set of cutting blades mounted on the spindle for rotation therewith, the set of blades including a lower, leading blade having a leading cutting edge and an upwardly angled trailing edge, and an upper, trailing blade having a leading cutting edge for cutting clippings deflected upwardly by the upwardly angled trailing edge of the leading blade, the trailing blade extending at a non-perpendicular angle relative to the leading blade so that clippings coming off the trailing edge of the leading blade are cut immediately by the trailing blade before the clippings start swirling around within the space.

~~16.~~ 15 A lawn mower as set forth in claim ~~11~~ 12 wherein the deck assembly also includes a first front wheel supporting one of the side plates for movement over the ground, a second front wheel supporting the other of the side plates for movement over the ground, and a rear roller extending between the side plates and supporting the side plates for movement over the ground, wherein the deck is located in front of the roller, and wherein the deck has a width such that the roller extends across substantially the entire width of the deck.

16. A lawn mower as set forth in claim 12 wherein the ends of the cross member have thereon respective downwardly extending arms, the arms having respective lower ends, the lower end of one of the arms being connected to one of the side plates for pivotal movement about the generally horizontal, laterally-extending axis, and the lower end of the other of the arms being connected to the other of the side plates for pivotal movement about the generally horizontal, laterally-extending axis.

~~58.~~ 17 A gang-type rotary lawn mower comprising

a frame,

a pair of front wheels supporting the frame for movement over the ground,

a pair of rear wheels supporting the frame for movement over the ground,

a power source which is mounted on the frame and which drives at least one of the pairs of wheels,

an operator's seat mounted on the frame,

a steering system enabling the operator to steer the lawn mower,

at least two side-by-side front rotary cutting deck assemblies mounted on the frame in front of the front wheels, the front deck assemblies defining a gap between adjacent front deck assemblies, and

at least one rear rotary cutting deck assembly mounted on the frame behind the front wheels and in front of the rear wheels, each rear deck assembly being aligned with a respective gap between adjacent front deck assemblies,

each of the front and rear deck assemblies including a pair of laterally-spaced, generally vertically-extending side plates having forward ends, a first front wheel supporting one of the side plates for movement over the ground, a second front wheel supporting the other of the side plates for movement over the ground, a rear roller extending between the side plates and supporting the side plates for movement over the ground, a

single-spindle cutting deck defining a downwardly opening space, the deck being located between the side plates and in front of the roller and being mounted on the side plates such that the height of the deck relative to the ground is adjustable, the deck having a width such that the roller extends across substantially the entire width of the deck, a single spindle mounted for rotation about a generally vertical axis within the space, at least one cutting blade mounted on the spindle for rotation therewith, and

each of the deck assemblies being connected to the frame by a respective generally L-shaped, horizontally-extending lifting arm operable to lift the associated deck assembly relative to the frame, such that each of the deck assemblies is connected by its own lifting arm to the frame, each arm having a laterally-extending inner leg with an inner end connected to the frame for pivotal movement about a generally horizontal axis extending in the forward-rearward direction, and each arm having an outer leg extending in the forward-rearward direction, the outer leg having an outer end, and a cross member mounted on the outer end of the outer leg for pivotal movement about a generally vertical axis and about a generally horizontal axis extending in the forward-rearward direction, the cross member having opposite, laterally-spaced ends, one of the cross member ends being connected to one of the side plates of the associated deck assembly for pivotal movement about a generally horizontal, laterally-extending axis adjacent the forward ends of the side plates, and the other of

the cross member ends being connected to the other of the side plates of the associated deck assembly for pivotal movement about the generally horizontal, laterally-extending axis.

~~18~~ 18. A lawn mower as set forth in claim ~~13~~ 17 wherein each deck assembly also includes a hydraulic motor which is mounted on the deck and which is drivingly connected to the spindle.

~~19~~ 19. A lawn mower as set forth in claim ~~13~~ 17 wherein each deck assembly includes a set of cutting blades mounted on the spindle for rotation therewith, the set of blades including a lower, leading blade having a leading cutting edge and an upwardly angled trailing edge, and an upper, trailing blade having a leading cutting edge for cutting clippings deflected upwardly by the upwardly angled trailing edge of the leading blade, the trailing blade extending at a non-perpendicular angle relative to the leading blade so that clippings coming off the trailing edge of the leading blade are cut immediately by the trailing blade before the clippings start swirling around within the space.

ABSTRACT OF THE DISCLOSURE

A gang-type rotary lawn mower including a frame supported by wheels for movement over the ground, a power source which is mounted on the frame and which drives at least two of the wheels, an operator's seat mounted on the frame, a steering system enabling the operator to steer the lawn mower, at least two side-by-side front rotary cutting deck assemblies mounted on the frame, the front deck assemblies defining a gap between adjacent front deck assemblies, and at least one rear rotary cutting deck assembly mounted on the frame behind the front deck assemblies, each rear deck assembly being aligned with a respective gap between adjacent front deck assemblies, each of the front and rear deck assemblies including a single-spindle mulching deck defining a downwardly opening space, a single spindle mounted for rotation about a generally vertical axis within the space, and at least one cutting blade mounted on the spindle for rotation therewith.

Declaration and Power of Attorney For Patent Application

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled "GANG-TYPE ROTARY LAWN MOWER" (Attorney Docket No. 78209/9009), the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

And I hereby appoint JOSEPH A. GEMIGNANI, (Reg. No. 19,482), ROBERT E. CLEMENCY (Reg. No. 19,287), DAVID B. SMITH (Reg. No. 27,595), GLENN A. BUSÉ (Reg. No. 24,217), FRED WIVIOTT (Reg. No. 19,158), DAVID R. PRICE (Reg. No. 31,557), ROBERT S. BEISER (Reg. No. 28,687), BAYARD H. MICHAEL (Reg. No. 15,974), CASIMIR F. LASKA (Reg. No. 30,862), KENT S. BARTA (Reg. No. 29,042), DAVID L. DE BRUIN (Reg. No. 35,489), TIMOTHY M. KELLEY (Reg. No. 34,201), ELIZABETH HUNT SCHOETTLY (Reg. No. 36,922), BILLIE JEAN STRANDT (Reg. No. 36,940), THOMAS A. MILLER (Reg. No. 36,871), KEVIN P. MORAN (Reg. No. 37,193) and WITOLD A. ZIARNO (Reg. No. 39,888), 100 East Wisconsin Avenue, Milwaukee, Wisconsin 53202-4108, Telephone (414) 271-6560, and each or any of them, my attorneys or agents, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

ADDRESS ALL COMMUNICATIONS IN OR PERTAINING TO THIS APPLICATION TO:

David R. Price
MICHAEL, BEST & FRIEDRICH
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Milwaukee, WI 53202-4108

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole inventor: Richard D. Bednar

Inventor's signature *Richard D. Bednar* — *1-31-97* Date

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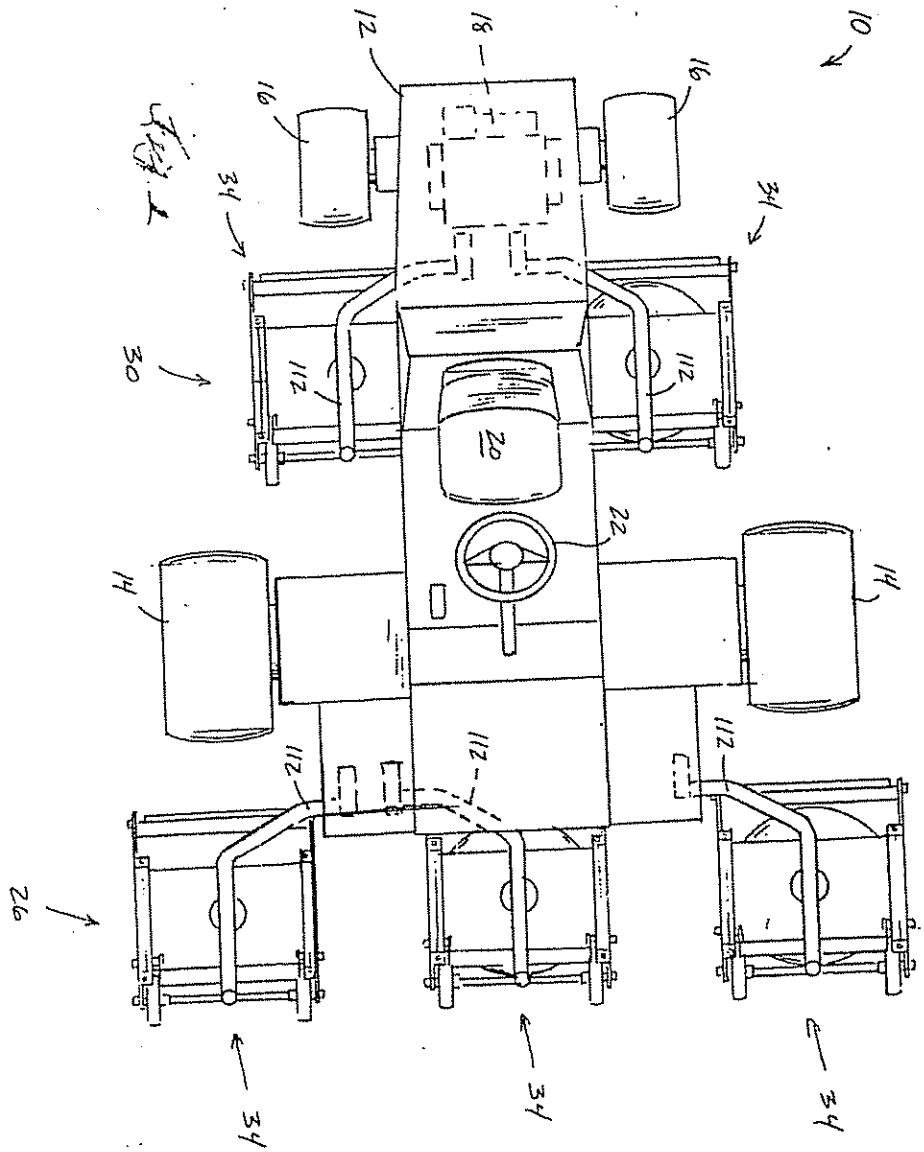

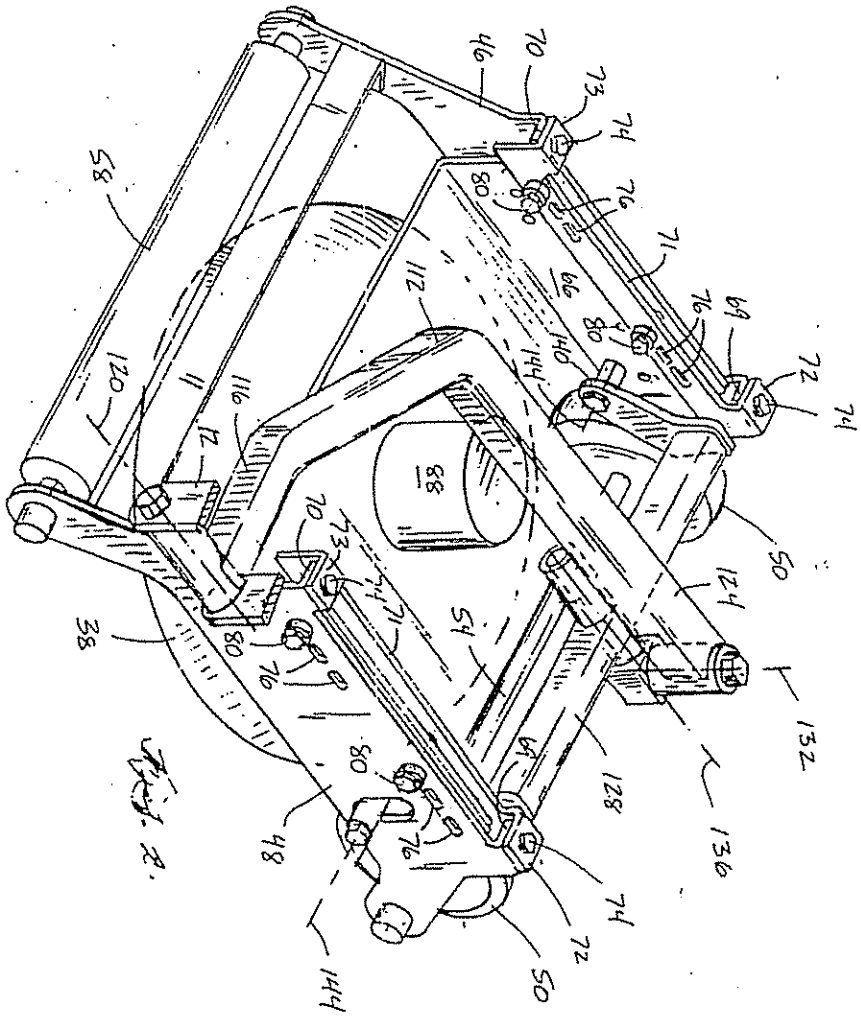

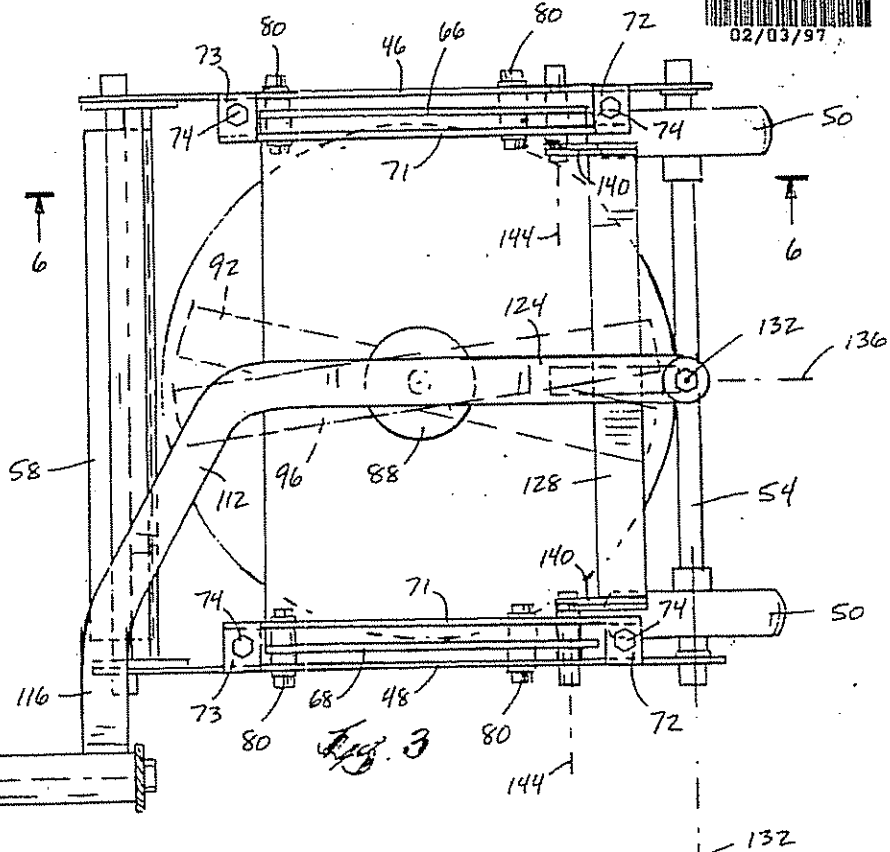

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Fig. 4

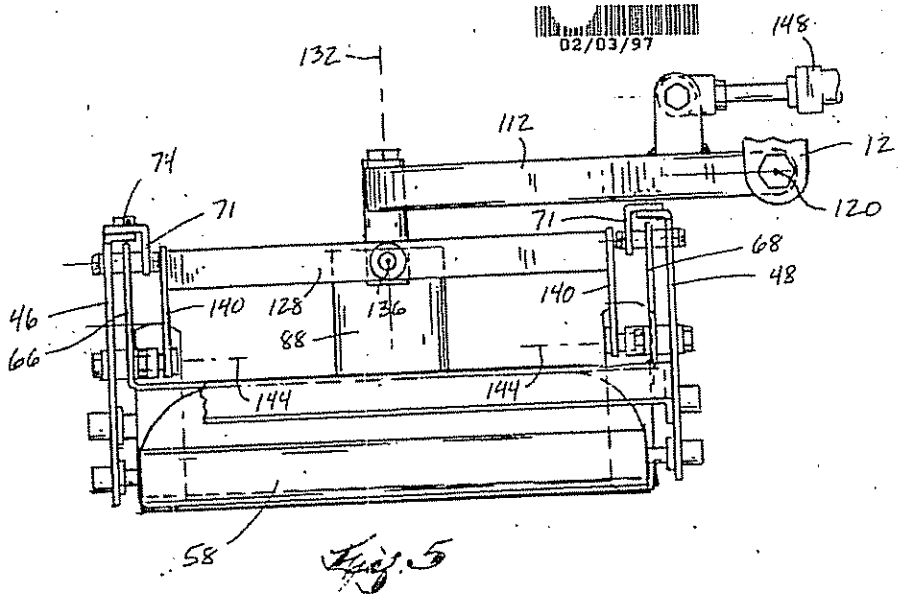

Fig. 5

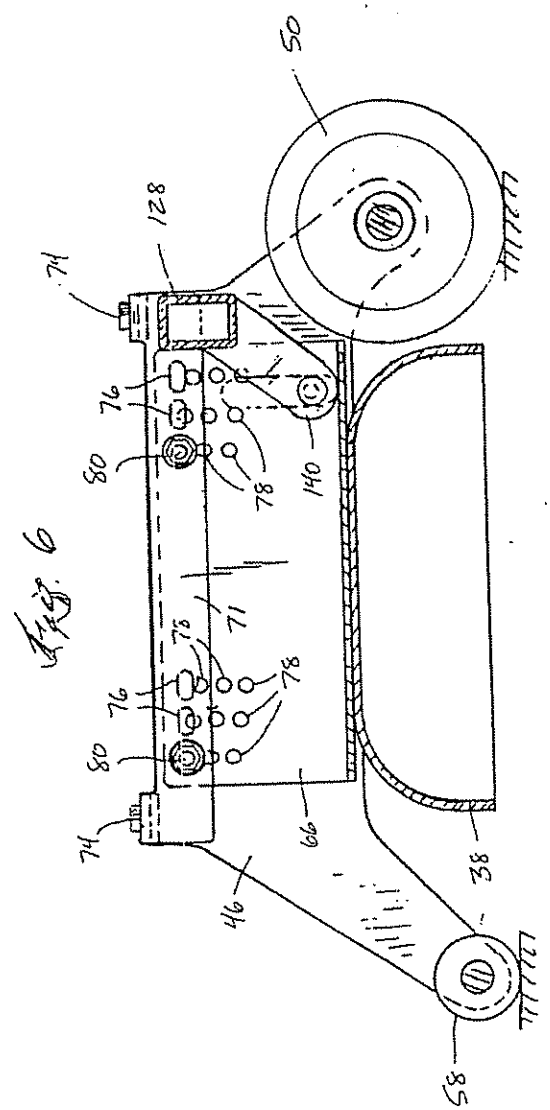

Fig. 6

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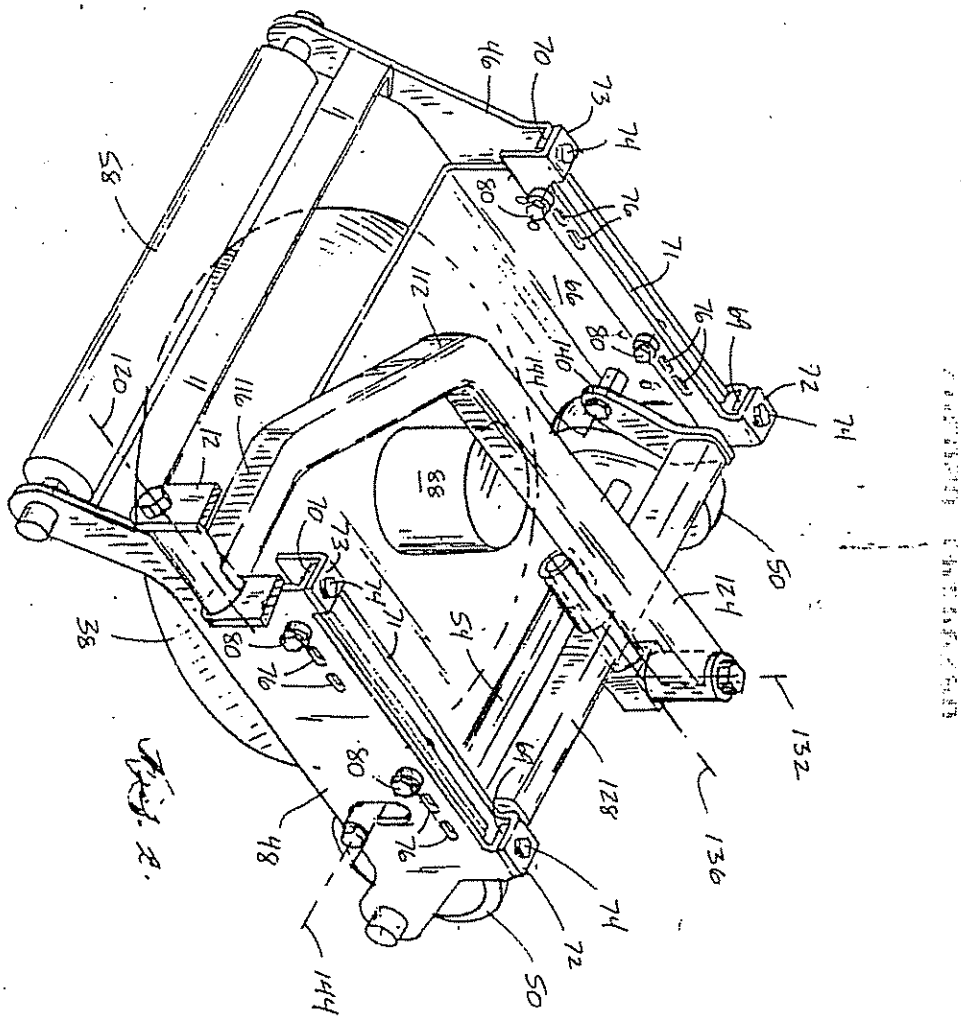

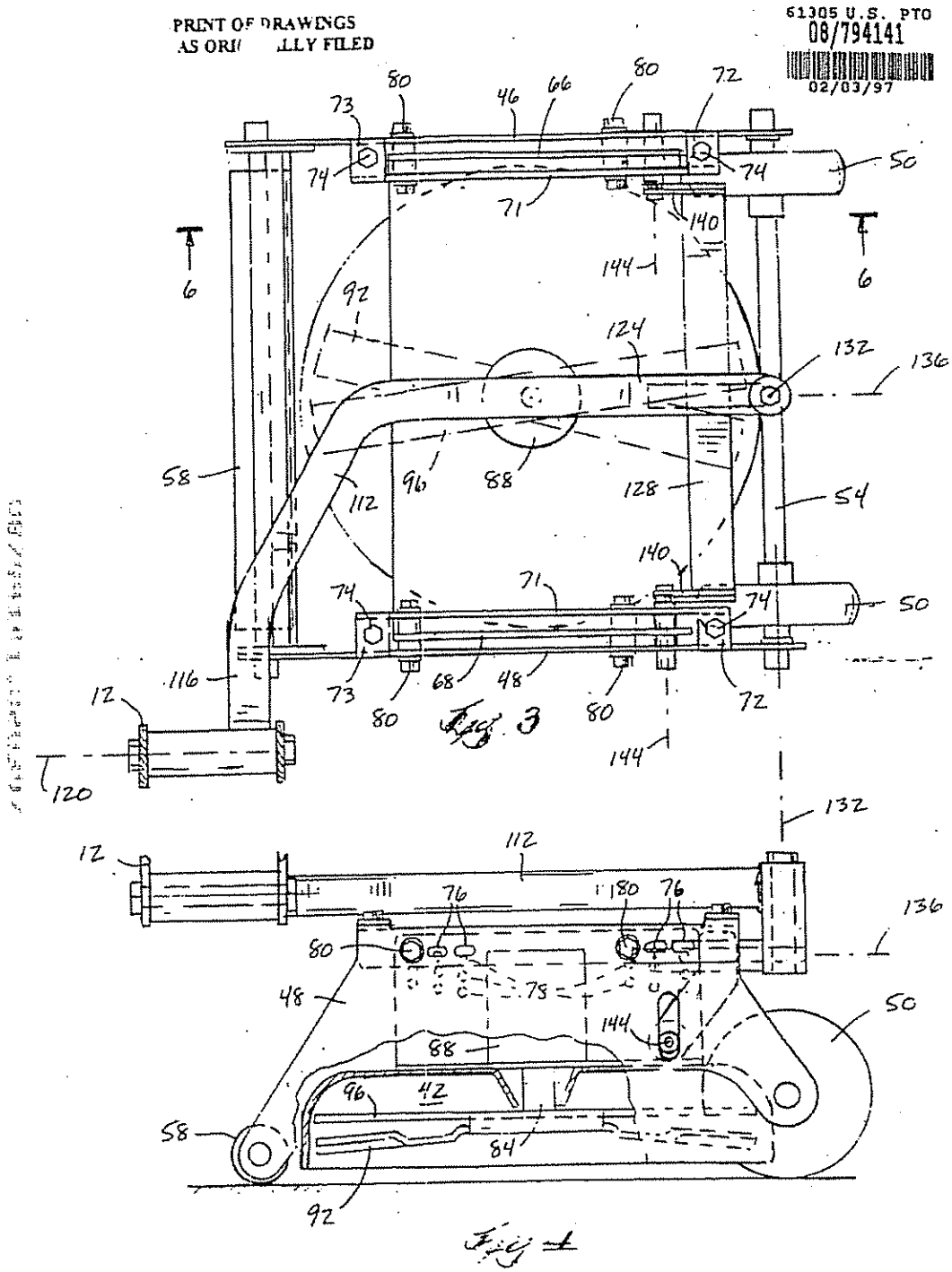
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Fig. 3

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Fig. 4

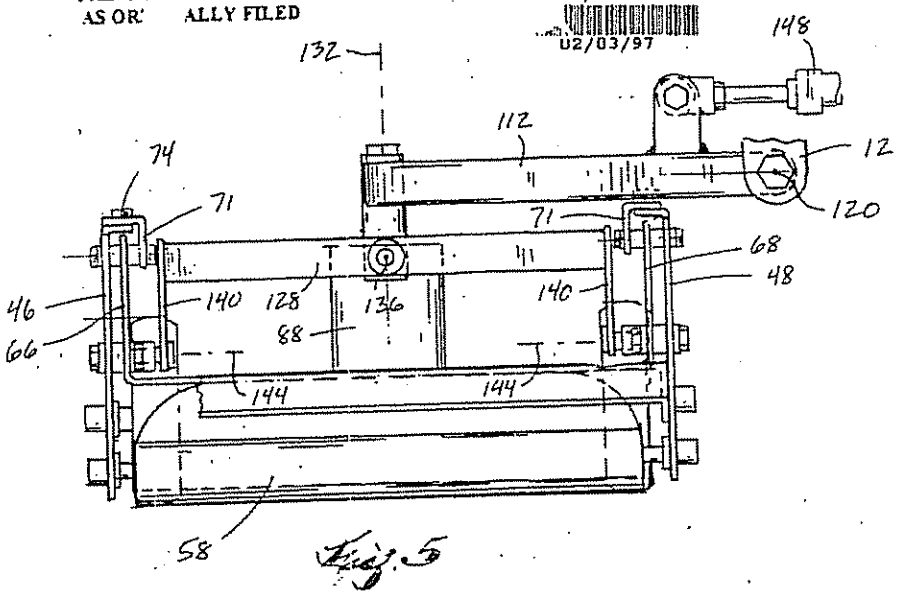

Fig. 5

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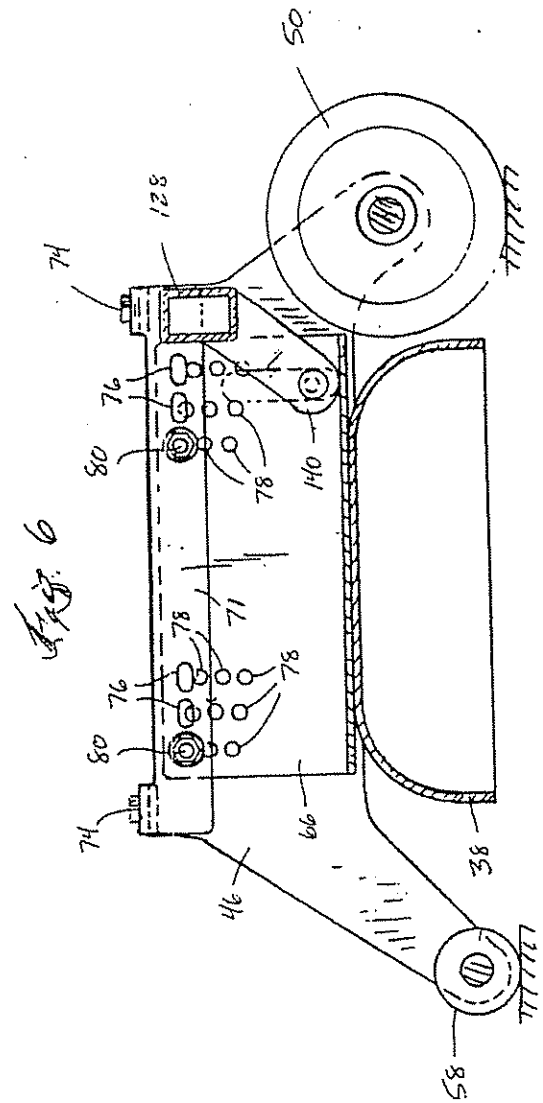
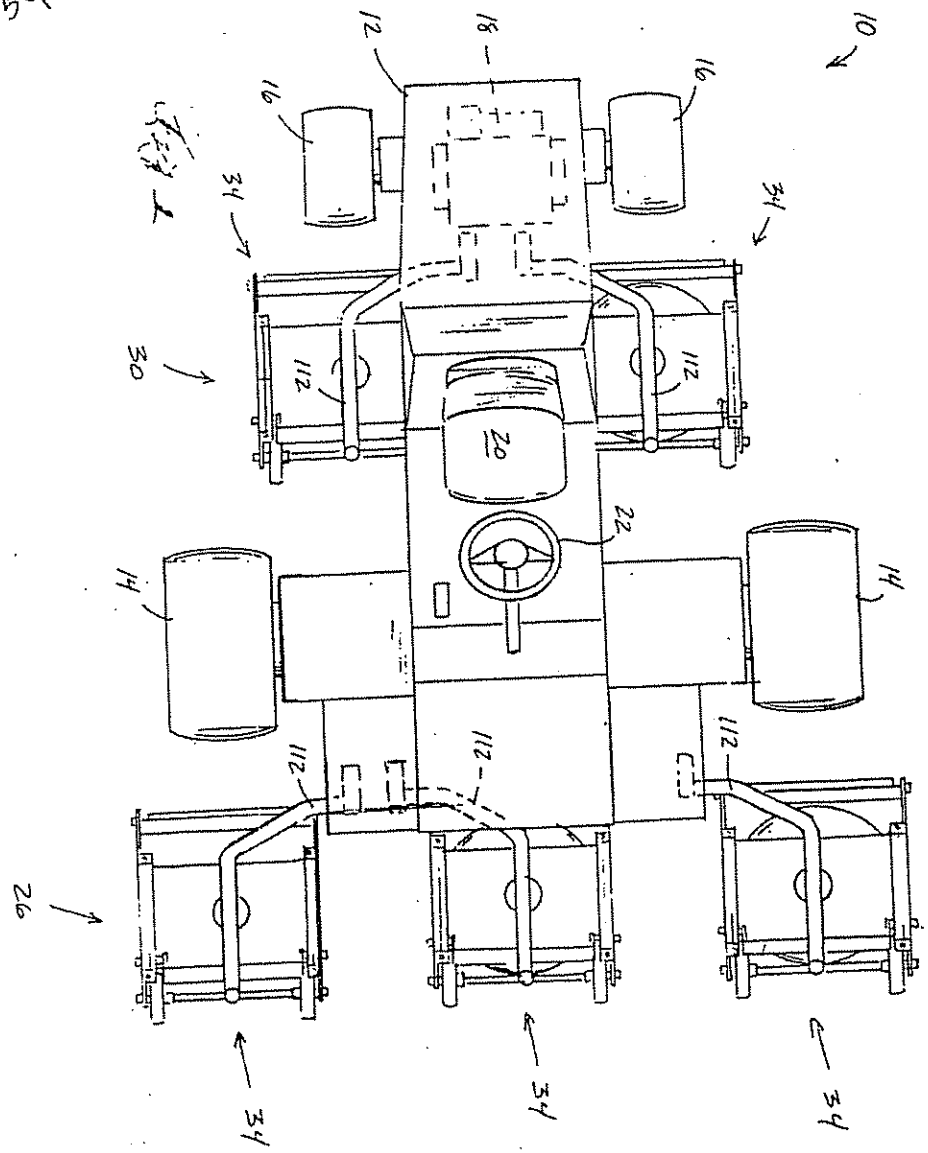


Fig. 6



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
GROUP ART UNIT 3501

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In re Patent Application of

Richard D. Bednar

Serial No. 08/794,141

Filed: February 3, 1997

"GANG-TYPE ROTARY LAWN MOWER"

I, Nora H. Hernandez, hereby certify that this correspondence is being deposited with the US Postal Service as first class mail in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231, on the date of my signature.

Nora H. Hernandez
Signature

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Washington, D.C. 20231

Sir:

The Examiner's attention is directed to the references which are listed on the attached Form PTO-1449 and copies of which are attached.

Citation of these references is respectfully requested.

Respectfully submitted,

David R. Price
Reg. No. 31,557

File No. 78209/9009

Michael, Best & Friedrich
100 East Wisconsin Avenue
Milwaukee, WI 53202-4108
(414) 271-6560

1477 U.S. PTO
05/05/97

Sheet 1 of 1

Form PTO-1449 (Rev. 2-32)
U.S. Department of Commerce
Patent and Trademark Office

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use several sheets if necessary)

Atty. Docket No. 78209/9009 | Serial No. 08/794,141

Applicant Richard D. Bednar

Filing Date February 3, 1997 | Group 3501

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2,504,259	04/18/50	F. M. Ford	56	25.4	
		3,070,938	01/01/63	W. A. Winget	—	—	
		3,118,266	01/21/64	R. R. Colburn	56	25.4	
		3,135,079	06/02/64	T. J. Dunn	56	6	
		4,308,713	01/05/82	James	56	11.9	
		5,137,100	08/11/92	Scott et al.	180	6.48	
		5,293,729	03/15/94	Curry et al.	56	7	
		5,297,378	03/29/94	Smith	56	7	
		5,343,680	09/06/94	Reichen et al.	56	249	
		5,355,665	10/18/94	Peter	56	15.8	
		5,412,932	05/09/95	Schueler	56	249	
		5,423,565	06/13/95	Smith	280	411.1	
		5,481,857	01/09/96	Umemoto et al.	56	12.6	
		5,497,604	03/12/96	Lonn	56	10.2 H	

Examiner Terry Lee Melius | Date Considered 3/31/98

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

GP 3501
#3
10-17-97

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
GROUP ART UNIT 3501

In re

Patent Application of

Richard D. Bednar

Serial No. 08/794,141

Filed: February 3, 1997

I, Patricia L. Schafer hereby certify that this correspondence is being deposited with the US Postal Service as first class mail in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231, on the date of my signature.

Patricia L. Schafer
Signature

10/3/97
Date of Signature

GANG-TYPE ROTARY LAWN MOWER

INFORMATION DISCLOSURE STATEMENT
PURSUANT TO 37 CFR §1.97(b)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

The Examiner's attention is directed to the reference which is listed on the attached Form PTO-1449 and a copy of which is attached.

Citation of this reference is respectfully requested.

Respectfully submitted,

David R. Price

David R. Price
Reg. No. 31,557

File No. 78209/9009

Michael, Best & Friedrich LLP
100 East Wisconsin Avenue
Milwaukee, WI 53202-4108
(414) 271-6560

Sheet 1 of 1

Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use several sheets if necessary)

Atty. Docket No.	Serial No.
78209/9009	08/794,141
Applicant	
Richard D. Bednar	
Filing Date	**Group**
02/03/97	3501

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

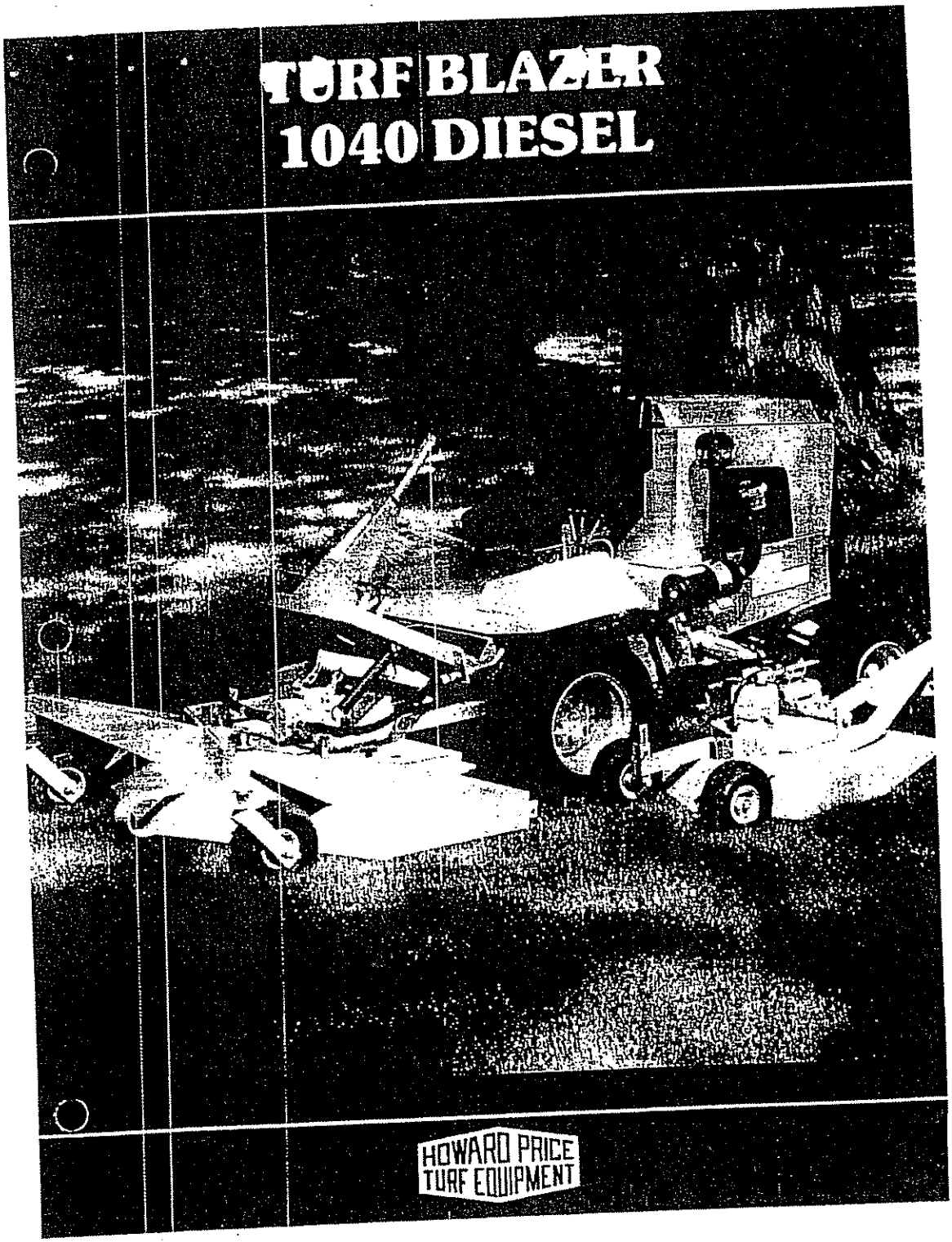
MR			Turf Blazer 1040 Diesel , Howard Price Turf Equipment (advertising brochure) (DATE: UNKNOWN)

Examiner: Terry Lee Melius

Date Considered: 3/31/98

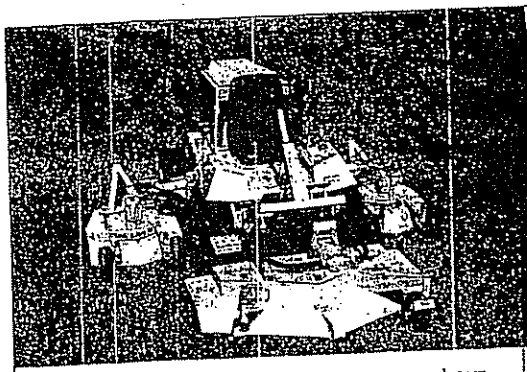
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

PTO1449.1


TURF BLAZER
1040 DIESEL
HOWARD PRICE
TURF EQUIPMENT

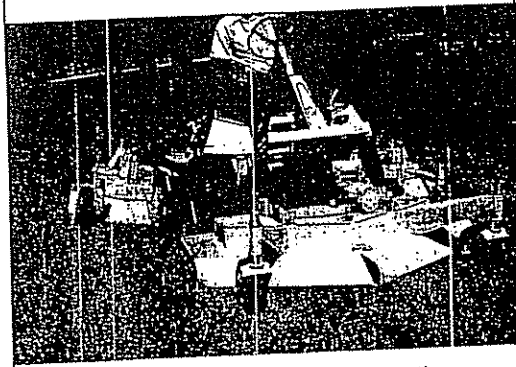
THE PRODUCTION MACHINE

"HIGH CAPACITY, ECONOMICAL, HIGH-FLOATATION"

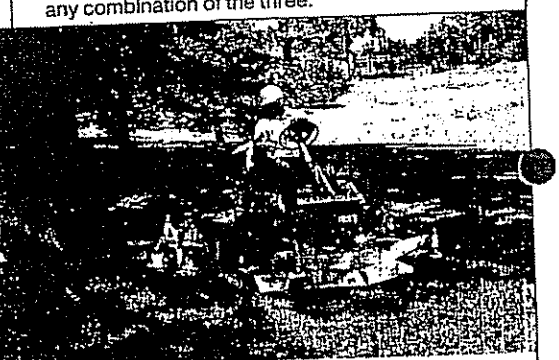


High capacity mowing of up to 5.3 acres per hour.

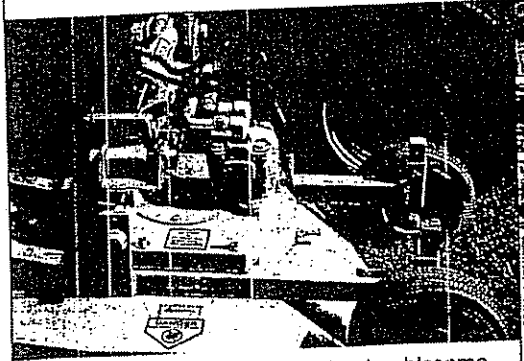
Cutting units may be operated individually or in any combination of the three.



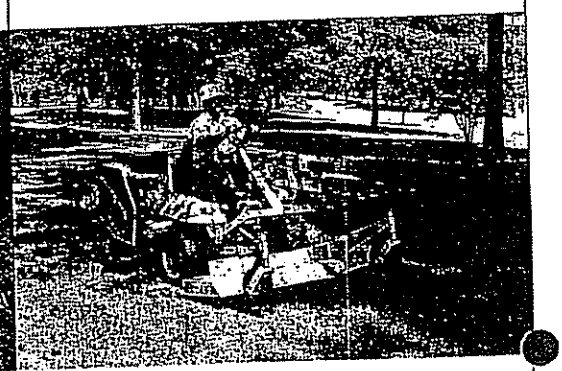
Individual decks allow for maximum floatation.



Unique trimming with outboard wing.



Wing hydraulic driven, eliminates troublesome long belts.



Lift and fold for ease of transport.

POWERED BY YAN[illegible]

Yanmar 4-cylinder diesel, water cooled 47 hp @ 3600 RPM governed down to 40 hp @ 3000 RPM for exceptional diesel lugging power when the going gets tough. This computer designed diesel is very fuel efficient and will perform countless hours of dependable service.

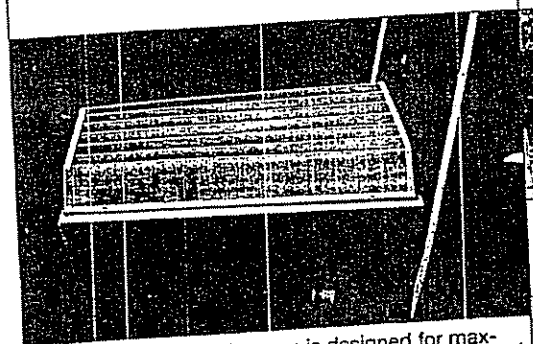
TRACTION BY SUNSTRAND AND DANA

The heavy-duty hydrostatic transmission coupled to a Dana GT-20 axle converts engine horsepower directly into traction without clutches or the shifting of gears. Response to operator control of speed and direction is both smooth and positive, providing infinitely variable speed from 0 to 10 mph.

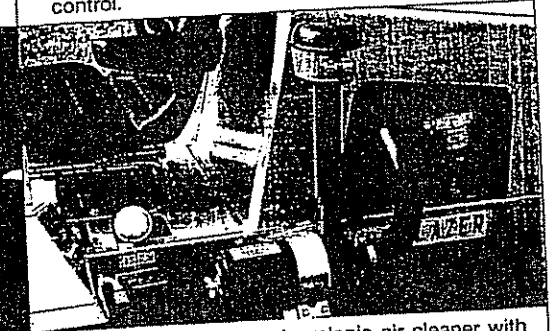
A triple B section, powerband belt transmits power simply and efficiently for PTO drive system requirements.

Dashboard instruments are console mounted for operator convenience and accessibility.

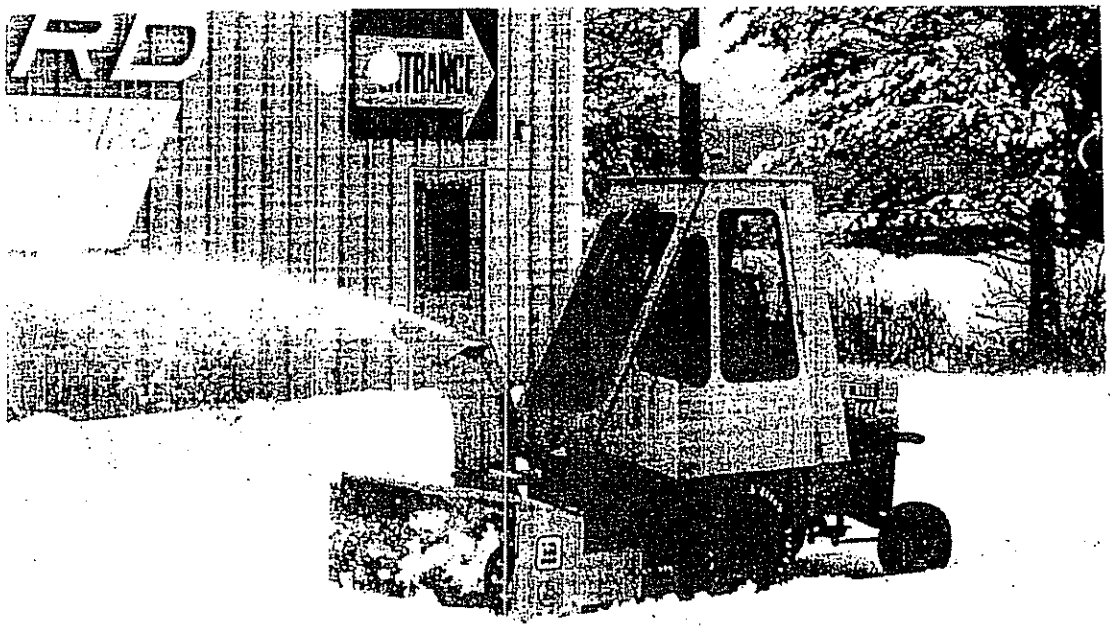
Solid ductile iron axles with tapered roller bearing supporting the spindles; extra strength, automotive ball joints; power steering, fingertip control.



Strategically located screen is designed for maximum filtration and ease of maintenance.



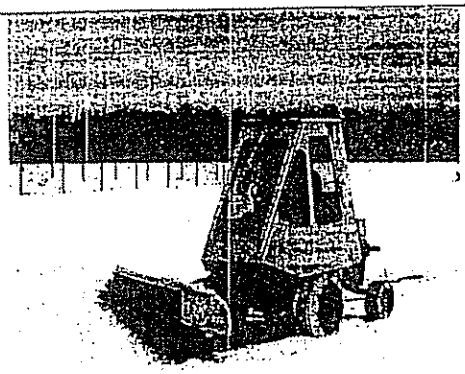
Heavy-duty agricultural cyclonic air cleaner with pre-cleaner.



YEAR-ROUND PERFORMANCE

When the snow moves in, the 1040 moves it out with a two-stage, 60" snow blower. Electric chute rotator enables the operator to deposit snow in any desired area with only the touch of a switch.

The steel and safety glass cab, mounted on the R.O.P.S. framework, commands a 360° view. Cab panels are demountable for use of R.O.P.S. for summer mowing season. The hot-water heater and defroster insure comfort and visability to the operator.



The 60" broom is ideal for sweeping light snow or cleaning debris off sidewalks. Available as 30° set angle on the brush head to the right or optional manual adjustment to either side.

If you prefer plowing snow, our 60", heavy-duty plow is ideal. Available with manual angling or optional hydraulic angling. Hydraulic angling is a valuable time saving tool when working in tight conditions.

SPECIFICATIONS
TURF BLAZER 1040

ENGINE:	Yanmar 4-cylinder diesel, water-cooled 47 HP @ 3600 RPM governored down to 40 at 3000 RPM, 83.11 CID, 18.06 compression ratio. Full pressure trochoid oil pump, 6 quart capacity with spin-on filter. High efficiency/low consumption swirl type pre-combustion chamber, cast iron cylinder head, block and oil pan. Double fuel filter and Racor water separator. Fast response centrifugal type governor. Thermostart system for cold weather starting, heavy duty agricultural cyclonic air cleaner with precleaner.
HYDRAULIC PTO DRIVE	6½ gallon, tractor mounted reservoir; High capacity oil cooler.
FUEL CAPACITY	9 gallons
TRACTION DRIVE	Sunstrand model 15, inline transmission with acceleration control valve mounted on Dana GT-20 transaxle.
WHEELS/TIRES	Front traction tires, high-floatation; 23-10.50 x 12, 4-ply rating. Rear steering tires, high floatation; 18-8.50 x 8, 4-ply rating. Both front and rear tires mounted on demountable drop center rims.
CHASSIS	Heavy formed and welded steel unitized frame with structural tubing reinforcement.
BRAKES	Dual 7" drum type brakes, independently operable for steering assist, single pedal for service and parking; dynamic braking through traction drive.
STEERING	TRW HGF power steering assembly with 15" wheel. Rear steering axle, heavy-duty, solid ductile iron. Steering spindles are supported with tapered roller bearings.
OPERATOR'S CONSOLE	Throttle, PTO and hydraulic lift levers, key-operated ignition switch, rocker type switches for lights, accessory and cold start, hourmeter, engine water temperature and fuel gauges, oil pressure and electrical discharge warning lights, 12V heavy-duty battery.
PTO DRIVE	High torque, triple B section band belt drive system, automatic fast response braking on disengagement, telescoping U-joint type drive shaft to attachment.
CERTIFICATION	This product conforms to ANSI specifications B71.4 1980.

104" ROTARY MOWER ATTACHMENT

WIDTH OF CUT	104"
CUTTING CAPACITY	Up to 5.3 acres per hour.
CENTER MOWER	60" rear discharge, 1½" to 5½" cutting height; Three (3) 5/16" x 2½" x 20½" heavy-duty, heat treated blades on 1¼" blade shafts.
	11 gauge formed steel blade housing; Formed and welded 3/16" steel spindle support frame for maximum rigidity; Vee-belt shock absorbing type drive to all spindles from PTO driven gearbox.
	Deck has spring counter balanced suspension system for maximum drive traction; Two (2) front mounted 4.10-3.50 x 4, 2-ply pneumatic swivel caster wheels with full roller bearing suspension; Single 2½" x 4" stroke cylinder for hydraulic power lift.
	Front deck can be operated with wings folded.
WING MOWERS	24" cut with rear discharge; 1½" to 5½" cutting height; Deck frame constructed of 1½" x 2" x 11 gauge steel tubing, mounted to 3/16" blade hub channel; Deck pan constructed of 11 gauge formed steel.
WING DRIVE	Hydraulic drive by gearbox mounted hydraulic pump; Pump capacity of 11 GPM @ 2500 PSI, 1.16 CID; Replaceable internal wear plate.
DECK MOTOR	Gear type; 1.02 CID with internal wear plate and case drain.
DECK WHEEL	Two (2) front mounted wheels; 4.10-3.50 x 4" wide, 2-ply pneumatic casters and 10¼ x 3⅜ semi-pneumatic caster wheels on rear.

ACCESSORIES

SNOW BLOWER

TYPE — Two-stage, 60" with 14" diameter auger and an 18" blower fan. Electric chute rotator standard.

WEIGHT — 525 lbs.

SNOW PLOW

TYPE — 60", heavy-duty rolled steel blade. High carbon hardened steel edge, spring loaded blade. Optional hydraulic angling kit available.

WEIGHT — 150 lbs.

BROOM

TYPE — 60" brushhead by 24" diameter. Fixed angle 30° to right. Optional manual angling 30° to either side. Overall dimensions and weight approximate.

WEIGHT — 300 lbs.

ROLL OVER PROTECTION SYSTEM (R.O.P.S.)

TYPE — 1½" x 2" x ⅛" wall, structural steel tubing, 14 gauge sun roof. Seat belts standard. Meets OSHA 1923.52 and SAE J1194 standards. Vehicle height with R.O.P.S. 78".

WEIGHT — 95 lbs.

CAB

TYPE — Formed 14 gauge panels mourt to R.O.P.S. frame. Safety glass in all windows. Windshield wiper standard.

OVERALL DIMENSIONS		
	WINGS FOLDED	WINGS UNFOLDED
HEIGHT	52"	52"
WIDTH	80"	105½"
LENGTH W/TRACTOR	114"	114"
WEIGHT	610#	610#
WEIGHT W/TRACTOR	2024	2024

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/794,141	02/03/97	BEDNAR R	7820979009

PM11/0413

DAVID R PRICE
MICHAEL BEST & FRIEDRICH
100 EAST WISCONSIN AVENUE
MILWAUKEE WI 53202-4108

EXAMINER	
MELIUS, T	
ART UNIT	PAPER NUMBER
3616	27

DATE MAILED: 04/13/98

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

PTO-90C (Rev. 2/95)
*U.S. GPO: 1995-404-693/40510

1- File Copy

Office Action Summary

Application No.	Applicant(s)
08/794,141	Richard D. Bednar
Examiner	**Group Art Unit**
Tracy Lee Mellins	3616

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Response

A SHORTENED STATUTORY PERIOD FOR RESPONSE IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a response be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for response is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to respond within the set or extended period for response will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

☑ Responsive to communication(s) filed on (application) February 3, 1997.

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

☑ Claim(s) 1-20 is/are pending in the application.

Of the above claim(s) ____ is/are withdrawn from consideration.

☑ Claim(s) 18-20 is/are allowed.

☑ Claim(s) 1-17 is/are rejected.

☐ Claim(s) ____ is/are objected to.

☐ Claim(s) ____ are subject to restriction or election requirement.

Application Papers

☑ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The proposed drawing correction, filed on ____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on ____ is/are objected to by the Examiner.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) ____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: ____.

Attachment(s)

☑ Information Disclosure Statement(s), PTO-1449, Paper No(s). 2+3

☐ Interview Summary, PTO-413

☑ Notice of References Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☑ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other ____

Office Action Summary

Part of Paper No. 4

U. S. Patent and Trademark Office
PTO-326 (Rev 3-97)

*U.S. GPO: 1997-417-381/62710

Serial Number: 08/794,141

Art Unit:

DETAILED ACTION

Drawings

1. **INFORMATION ON HOW TO EFFECT DRAWING CHANGES**

1. **Correction of Informalities** -- 37 CFR 1.85; 1097 O.G. 36

New formal drawings must be filed with the changes incorporated therein. The art unit number, application number (including series code) and number of drawing sheets should be written on the reverse side of the drawings. Applicant may delay filing of the new drawings until receipt of the "Notice of Allowability" (PTOL-37 or PTO-37). If delayed, the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the "Notice of Allowability" to avoid extension of time fees. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a) for filing the corrected drawings (but not for payment of the issue fee). The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

2. **Corrections other than Informalities Noted by Draftsperson on form PTO-948.**

Serial Number: 08/794,141

Art Unit:

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

Timing of Corrections

Applicant is required to submit acceptable corrected drawings within the three month shortened statutory period set in the "Notice of Allowability" (PTO-37). Within that three month period, two weeks should be allowed for review of the new drawings by the Office. If a correction is determined to be unacceptable by the Office, applicant must arrange to have an acceptable correction re-submitted within the original three month period to avoid the necessity of obtaining an extension of time with extension fees. Therefore, applicant should file corrected drawings as soon as possible.

Failure to take corrective action within the set (or extended) period will result in **ABANDONMENT** of the application.

Serial Number: 08/794,141

Art Unit:

Information Disclosure Statement

The Examiner would like to note that the PTO-1449 forms have been received.

Specification

2. The disclosure is objected to because of the following informalities:

1) On page 4 - line 19 and page 7 - penultimate line, the missing information should be inserted (if and when available).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. Claims 7-9 and 11-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As for claims 7 and 11, a cross member is stated as connecting the frame to the deck assembly. However, the specification and drawings do not show such an arrangement. Another member (L-shaped arm) connects the cross member to the frame. Clarification is requested.

In view of the above, claims 7 and 11 (as well as the additional claims listed) are considered indefinite and incomplete.

Also, in claim 11 - line 25 (last line on page 14), -- of -- should be inserted after "other" (second occurrence).

Serial Number: 08/794,141

Art Unit:

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made

5. Claims 1-7, 10, 11 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (5,297,378) in view of Nunes, Jr. et al (5,280,695).

Smith (submitted by Applicant) shows a substantially similar cutting arrangement as set forth in the listed claims, except for the use of a rotary cutting assembly instead of a reel-type cutting assembly. Each unit including side plates with a cutting "deck" therebetween wherein each unit is mounted to the frame of the vehicle. The back units positioned in the "gaps" of the front units.

Nunes, Jr. et al shows a gang type rotary mower with a similar arrangement (back units positioned in the gaps of the front units) The individual units driven by hydraulic motors connected to vertically mounted spindle assemblies. Rotary blades are mounted to the spindles (single or dual blade assemblies may be used since both are common in the mower art).

As for the listed claims, to modify the mower assembly of Smith to employ rotary mowers would have been considered an obvious modification to one of ordinary skill in the art at the time the present invention was made, particularly in view of the gang type rotary assembly set forth by Nunes, Jr. et al.

Serial Number: 08/794,141

Art Unit:

As set forth above, the use of dual blades (as well as the specific use of wheels) is well known within the mower art.

Allowable Subject Matter

Claims 18-20 are allowable as presently set forth.

6. Claims 8, 9, 12 and 13 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112 set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication should be directed to Examiner Terry Melius at telephone number (703) 308-1113.

The Examiner can normally be contacted any time Monday-Thursday.

T.L.M./tlm

4-9-1998

TERRY LEE MELIUS
PRIMARY EXAMINER
GROUP 350 AU 3616